Understanding the Role of Eutrophication on Aquatic Food Web Interactions in the Florida Everglades

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Expansive periphyton mats are a prominent feature of the Florida Everglades landscape. These mats provide both a primary food source and a habitat structure to a diverse macroinvertebrate community, creating a self-contained community. This "periphyton complex" is also an important food source for externally feeding macroinvertebrates and small-bodied fishes, forming the base of the Everglades food web. Eutrophication of the historically oligotrophic Everglades from agricultural areas in the vicinity of Lake Okeechobee has become a major threat to the system. While low levels of phosphorus (P) stimulate periphyton primary productivity, high levels of P seriously jeopardize the integrity of periphyton mats, causing them to break up and eventually disappear completely. Since the complex physical structure of periphyton mats makes sampling difficult, little is known about the mat-dwelling macroinvertebrate community, how it responds to changes in the mat with enrichment, and how these changes move up the food web into higher consumers.

This poster describes a method to quantitatively sample the macroinvertebrate community within the mat and the application of that method to quantify the spatial distribution of the mat-dwelling macroinvertebrate community inhabiting both submerged vegetation and benthic floc. We sampled several sites with various levels of P enrichment and hydroperiod to further assess the community response to environmental variables. Finally, in cooperation with the South Florida Water Management District (SFWMD) and the U.S. Geological Survey, Biological Resources Division, we conducted both *in situ* and tank mesocosm experiments to delineate how densities and feeding strategies of common consumer species (*Gambusia holbrooki*, *Poecilia latipinna*, and *Palaemonetes paludosus*) interact with the periphyton mat community and how these relationships change with P loading. Defining the role of this microhabitat in the Everglades food web is an important step in understanding the system and to what extent it is impacted by eutrophication.

The sampling protocol developed in this study is currently being used in a cooperative study between Florida International University (FIU) and Everglades National Park (ENP). All work was conducted with cooperation from ENP and is part of the Florida Coastal Everglades Long Term Ecological Research (FCE-LTER). This research is a product of my doctoral research at FIU and was funded in large part by an EPA STAR-GRO Fellowship.